

Attachment 5 Specifications

A GAS-WDM fiber optic link prototype to connect the seven antenna signals from the GPS GAS-1 Controlled Radiation Pattern Antenna (CRPA), which in deployed systems is mounted on the antenna mast, to the Antenna Electronics (AE), which will be mounted below deck, shall be designed, fabricated, tested, and delivered. The GAS-WDM fiber optic link prototype shall be suitable for deployed testing. As such, it is required to meet the minimum performance and configuration requirements below.

Combined amplifier/filter RF photonic WDM link (specifications are for complete link including amplifiers/filters, laser transmitters, WDM devices, optical receivers, fibers and connectors. The specifications below assume presence of 5 dB optical loss (10 dB RF loss) in the link due to connectors, optical splitter, and optical switch shown in Figure 1 of Attachment 6).

Operating Frequency: GPS L1 (1575.42MHz) and L2 (1227.6 MHz) simultaneously.

Overall Gain +3 dB minimum to +10 dB maximum.

Gain Variation: 2 dB maximum between any channels at L1 or L2, 3 dB maximum between L1 and L2.

Noise Figure: 4 dB maximum over temperature

Bandwidth: 24 MHz passband centered about the L1 and L2 frequencies
Passband ripple 1 dB maximum
-40 dB minimum at 200 MHz centered about the L1 and L2 frequencies
-60 dB minimum at 300 MHz centered about the L1 and L2 frequencies
(excluding between L1 and L2)

Out of band rejection: A signal at any frequency between 30 Hz and 10 GHz, but excluding the frequency bands within ± 200 MHz of the L1 and L2 frequencies, shall not have an output response greater than -60 dB when compared to an in-band signal of equal level.

VSWR: 2:1 maximum at the RF inputs and output

Gain compression measured at the input, the 1 dB gain compression point is -32 dBm minimum.

IP3 Input IP3 -23 dBm minimum

Burnout protection: 1 watt continuous, 450 watt peak with pulse width of 10 microseconds.

Phase Noise: -100 dBc maximum added to the L1 or L2 signal over the frequency band of 100 Hz to 12 MHz

Group Delay Variation: 0.1 nsec between any channels at L1 or L2. It is acceptable to correct for the phase of the complete link on the transmit side of the link (as shown in Figure 1 of Attachment 6).

Electrical connectors:

RF Input: 7 SMA connectors, one male, and 6 female.

RF Output: either 7 SMA (1 male and 6 female) connectors, or coax contacts on a multi-pin connector. This connector may be the power connector or a separate connector. If SMA connectors are used, the male shall be on the same channel as the male connector of the input (referred to as the "reference channel")

Power: solder terminals or multi-pin "D" or round connector

Optical connectors: Diamond AVIM, angle polished. A pigtail is not acceptable.

Indicators & alarms: LEDs on module, and open collector signals on electrical connector (low voltage for fault condition)

Laser: Laser power and/or laser current, temperature stable.

Detector: detector current and/or optical power input

Temperature: For the transmit antenna side components: -40°C to +85°C operating, -55°C to +85°C storage, where the maximum cold plate temperature is 64°C. For the receiver side components: 0°C to +50°C. (Note: unit must operate within specification with transmit unit at one temperature extreme and receiver unit at the opposite temperature extreme.)

Vibration: System shall be designed for 4 Hz to 50 Hz per MIL-STD-167 for mast mounted equipment. Testing and verification not required, testing is done on complete antenna assembly, not on individual components.

Shock: System shall be designed for 9 hammer blows as specified in MIL-S-901, Type A, Grade A, Class I. Testing and verification not required, testing is done on complete antenna assembly and receiver rack, not on individual components.

Power supply: Contractor shall specify. System can use provided DC or AC power. If DC, system shall not require more than two DC supplies ($-16\text{ V} < \text{VDC} < 16\text{ V}$). Alternately, 103 – 127 VAC, 47 – 440 Hz per MIL-STD 1399 may be used (i.e., if the contractor incorporates DC supplies in delivered system). If this option is chosen, external line filter and surge protection to meet the transient requirements are provided.

Power requirement: The power requirement for the transmit side antenna components shall be 70 watts maximum.

Size: Transmit side antenna unit shall fit in a space approximately 12 inches by 10 inches by 2 ½ inches high. A Drawing is supplied – see Figure 2 of Attachment 6. Receiver side detector unit shall fit in a space 7 inches by 7 inches by 2 ½ inches high.

Isolation: The RF isolation between antenna channels shall be >30 dB